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REMARKS

Claims 1-13 were pending in the present application. Claims 4 and 11 have been canceled, the features of which have been incorporated into independent Claims 1 and 6, respectively, leaving Claims 1-3, 5-10, and 12-13 for further consideration in the present amendment. No new matter has been entered in view of the amendments.

Reconsideration and allowance of the claims are respectfully requested in view of the above amendments and the following remarks.

First Claims Rejection Under 35 USC §103(a)

Claims 1, 3, and 13 stand rejected under 35 U.S.C. §103(a) as being unpatentable over US Patent No. 4,490,211 to Chen et al. in view of US Patent Application No. 2002/0072228 to Kuo. Applicants respectfully traverse.

US Patent No. 4,490,211 to Chen et al. (hereinafter "Chen") generally describes a process of etching a copper layer by excimer laser radiation. A solid reaction product is first formed by exposing the copper layer to a chlorine gas. The solid reaction product is formed by a partial consumption of the metal. The reaction product is characterized as copper chloride, which is then irradiated with an excimer laser for selective removal of the copper chloride reaction product. The copper chloride reaction product is vaporized due to heating of the reaction product by absorption of the radiation, thereby exposing a "fresh" layer of copper metal. The process is repeated to completely etch the metal layer.

U.S. Patent Publication No. 20002/0072228A1 to Kuo (hereinafter "Kuo") generally describes a method of forming a fuse using plug material in contrast to prior art processes that form fuses from metal layers. The method includes fabricating a grooved W fuse from W plugs that are surrounded by a guard ring formed of metal lines and plugs. The method permits control of the remaining oxide thickness on a grooved tungsten fuse during a fuse window etching process.

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For an obviousness rejection to be proper, the Examiner must meet the burden of establishing a prima facie case of obviousness. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988). Establishing a prima facie case of obviousness requires that all elements of the invention be disclosed in the prior art. *In Re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970).

A prima facie case has not been established because none of the cited references, individually or in combination, teach or suggest removing unreacted halogen gas from the surface by scanning the surface with an electron beam. As noted in the present Office Action (Section 9, Page 6), “[m]odified Chen et al. discussed above in paragraph 6 does not teach that an electron beam scan is applied to the metal surface in order to remove the unreacted gas.” For reasons that are discussed below in the section entitled “Sixth Claims Rejections Under 35 USC 103(a)”, the Kawanami reference relied upon by the Examiner fails to establish a prima facie case.

Accordingly, the rejection of Claims 1, 3, and 13 is requested to be withdrawn.

Second Claims Rejection Under 35 USC §103(a)

Claim 2 stands rejected under 35 U.S.C. §103(a) as being unpatentable over US Patent No. 4,490,211 to Chen et al. in view of US Patent Application No. 2002/0072228 to Kuo as applied to Claims 1, 3, and 13 above, and further in view of Sawin et al. Applicants respectfully traverse.

For reasons previously discussed, modified Chen fails to teach or suggest removing unreacted halogen gas from the surface by scanning the surface with an electron beam. Sawin fails to compensate for the deficiencies of modified Chen.

Accordingly, a prima facie case has not been made based on a combination of the cited references, and the rejection of Claim 2 should be withdrawn.

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Third Claims Rejection Under 35 USC §103(a)

Claim 5 stands rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over US Patent No. 4,490,211 to Chen et al. in view of US Patent Application No. 2002/0072228 to Kuo as applied to Claims 1, 3, and 13 above, and further in view of U.S. Patent No. 6,194,720 to Li et al. Applicants respectfully traverse.

Chen and Kuo are discussed above. The Examiner relies on Li to teach that the beam current comprises an energy from about 1500-300 picoAmps. However, Li fails to teach or suggest removing unreacted halogen gas from the surface by scanning the surface with an electron beam.

Claim 5 is dependent upon Claim 1 and as such, includes all of the features found in Claim 1 including the feature of removing unreacted halogen gas from the surface by scanning the surface with an electron beam. Since Claim 5 does not teach or suggest this feature, the rejection is requested to be withdrawn for at least this reason.

Fourth Claims Rejection Under 35 USC §103(a)

Claims 6-10 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over US Patent No. 4,490,211 to Chen et al. in view of US Patent Application No. 2002/0072228 to Kuo as applied to Claims 1, 3, and 13 above, and further in view of U.S. Patent No. 6,211,527 to Chandler et al. Applicants respectfully traverse.

U.S. Patent No. 6,211,527 to Chandler et al. (hereinafter "Chandler") is generally directed to focused ion beam milling and an etch assisted gas for making connections to conductors buried under dielectric layers.

Independent Claim 6 has been amended to include the feature of removing unreacted halogen gas from the surface by scanning the surface with an electron beam. Chandler, like Chen and Kuo, fail to teach or suggest at least this feature.

As all elements of independent Claim 6 have not been taught, this claim is patentable over the cited references, individually or in combination. Given that Claims 7-10 each further limits and ultimately depends from Claim 6, they too are patentable.

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Fifth Claims Rejection Under 35 USC §103(a)

Claim 12 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable as allegedly unpatentable over US Patent No. 4,490,211 to Chen et al. in view of US Patent Application No. 2002/0072228 to Kuo, and U.S. Patent No. 6,211,527 to Chandler et al as applied to Claims 6-10 above, and further in view of U.S. Patent No. 6,194,720 to Li et al. Applicants respectfully traverse.

For reasons previously discussed, the cited references fail to teach or suggest removing unreacted halogen gas from the surface by scanning the surface with an electron beam. Accordingly, it is requested that the rejection of Claims 12 be withdrawn.

Sixth Claims Rejection Under 35 USC §103(a)

Previously allowed Claims 4 and 11 now stand rejected under 35 U.S.C. § 103(a) as allegedly unpatentable as allegedly unpatentable over US Patent No. 4,490,211 to Chen et al. in view of US Patent Application No. 2002/0072228 to Kuo, and U.S. Patent No. 6,211,527 to Chandler et al as applied to Claims 6-10 and also Claim 1 above, and further in view of U.S. Patent No. 5,532,494 to Kawanami et al. Applicants respectfully traverse.

Kawanami generally describes a treatment and observation apparatus that uses a scanning probe capable of ensuring fixed treatment accuracy regardless of a size of an area to be treated. Treatment accuracy generally requires magnification of a reference area that comprises the whole area of interest. A portion of the whole area (e.g., an area to be treated) is magnified and observed forming a second image having a defined pixel location relative to the reference image. Because a higher magnification is employed for capturing the second image, which is used to designate an area to be treated, the patentees indicate that treatment of the area within the second image is at a higher accuracy. Third images as well as higher numbers of images can be observed at the same magnifications as the second image to provide a combined image that can then be stored in image memory. The various images can be used to relate the addresses of the pixels on the sample surface. With regard to the types of treatments, Kawanami is silent and is

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believed to be generally directed to repetitive imaging of various portions of the substrate.

Applicants first traverse the rejection on the grounds that Kawanami is non-analogous art. For the purposes of evaluating obviousness of claimed subject matter, the particular references relied upon must constitute "analogous art". *In re Clay*, 966 F.2d 656, 659, 23 U.S.P.Q.2d 1058, 1060-61 (Fed. Cir. 1992). The art must be from the same field of endeavor, or be reasonably pertinent to the particular problem with which the inventor is involved. *Id.* Kawanami generally describes a treatment and observation apparatus. Applicants are at a loss as to how Kawanami relates to a process for milling copper metal from a substrate having an exposed copper surface. There is no disclosure or suggestion of a milling process. Moreover, there is no disclosure of a milling process directed to copper metal surfaces. Thus, Kawanami cannot possibly be construed as being from the same field of endeavor, or being reasonably pertinent to the particular problem with which the inventor is involved, i.e., a milling process for copper.

Secondly, for an obviousness rejection to be proper, the prior art relied upon, coupled with knowledge generally available in the art at the time of the invention, must contain some suggestion or incentive that would have motivated the skilled artisan to modify a reference or combined references. Kawanami provides no such motivation or suggestion. As discussed above, Kawanami is believed to generally describe an imaging apparatus for observation of a treatment area on a substrate. Kawanami is silent as to milling processes and as such, includes no such disclosure for processes designed for use with copper metal.

Thirdly, the combination of cited references still fails to teach or suggest removing unreacted halogen gas from the surface by scanning the surface with an electron beam. For an obviousness rejection to be proper, the Examiner must meet the burden of establishing that all elements of the invention are disclosed in the prior art. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988); *In Re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970); *Amgen v. Chugai Pharmaceuticals Co.*, 927 U.S.P.Q.2d, 1016, 1023 (Fed. Cir. 1996).

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The passage relied upon by the Examiner to support its position that the feature, removing unreacted halogen gas from the surface by scanning the surface with an electron beam, is taught in the combination of references is reproduced below:

Further, as the focused ion beam, electrons can be used in addition to the ions in the above embodiment. By introducing a reactive gas of fluorine or chlorine in the vicinity of the surface of the sample irradiated with the beam of ions or electrons, the beam-induced etching can be performed. In this case, it is advantageous that the etched particles are not left and the etching speed is increased. In the depositing work or treatment, gas containing an element to be deposited is locally blown away on the vicinity of the surface of the sample irradiated with the beam by a nozzle to thereby effect the beam induced deposit.

(Column 12, line 64 to Column 13, line 5)

The passage teaches and suggests that beam-induced etching of a surface occurs upon irradiating the surface with a focused ion or electron beam after the surface has been exposed to a reactive gas. This passage fails to teach or suggest *removing unreacted halogen gas from the surface by scanning the surface with an electron beam* as claimed by Applicants. Rather, the ion or electron beam reacts with and etches the surface having introduced thereto the reactive gas. Removal is of the etched particles, which is locally blown away by a nozzle. This is markedly different from the feature of *removing unreacted halogen gas from the surface by scanning the surface with an electron beam*. Removal of unreacted halogen gas is not the same as removal of etched particles.

Further, even assuming, *in arguendo*, that all elements of an invention are disclosed in the prior art, an Examiner cannot establish obviousness by locating references that describe various aspects of a patent applicant's invention without also providing evidence of the motivating force which would have impelled one skilled in the art to do what the patent applicant has done. *Ex parte Levingood*, 28 U.S.P.Q.2d 1300 (Bd. Pat. App. Int. 1993). The references, when viewed by themselves and not in retrospect, must suggest the invention. *In Re Skoll*, 187 U.S.P.Q. 481 (C.C.P.A. 1975). Applicants further maintain that the Examiner has used an improper standard in arriving at the rejection of the above claims under section 103, based on improper hindsight,

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which fails to consider the totality of applicant's invention and to the totality of the cited references. More specifically the Examiner has used Applicant's disclosure to select portions of the cited references to allegedly arrive at Applicant's invention. In doing so, the Examiner has failed to consider the teachings of the references or Applicant's invention as a whole in contravention of section 103.

In view of the foregoing, the rejections applied to Claims 1-3, 5-10, and 12-13 are requested to be withdrawn.

It is believed that the foregoing remarks fully comply with the Office Action and place the application in condition for immediate allowance, which action is earnestly solicited. If there are any fees due in connection with the Response, or otherwise, Applicants' attorneys authorize that such fee be charged to Deposit Account No. 09 0458.

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Respectfully submitted,

CANTOR COLBURN LLP

By:

Peter R. Hagerty
Registration No. 42,518

OFFICIAL

Date: August 19, 2003
Customer No.: 29371
Address: 55 Griffin Road South
Bloomfield, CT 06002
Telephone: (860) 286-2929